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Barcode UK—Moving beyond the Visible

Collaborative Research between a Photographic Artist and

Botanical Scientists

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**Barcode UK—Moving beyond the Visible: Collaborative Research between a Photographic Artist and Botanical Scientists**

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*Abstract: Using as a case study the author’s second collaborative research project with botanical scientists based upon the Barcode UK research initiative, and with reference to a range of other science/art projects, this paper explores the insights, findings, and added value of art and science collaborations. The author is a photographic artist and researcher and has collaborated with botanical scientist Dr. Natasha De Vere, lead scientist at the National Botanic Garden of Wales during two science research projects, the first project to identify the DNA of the native flora of Wales and the second, upon which this paper is focussed, the DNA of the flora of the UK. The author’s photography has its origins in a twelve-year research project to find new ways of photographing the landscape, to counter the established conventions of the picturesque and sublime. The author’s current photographic practice has developed directly from the science/art interaction and is a visual representation of one of the applications of the science—the role of moths in pollination, and will form a touring exhibition Barcode UK—Moving beyond the Visible, in early 2014.*

*Keywords: Eco-aesthetics, Nature, Representation*

arcode UK—Moving beyond the Visible is a research project leading to a touring exhibition in 2014, based upon the second phase of my ongoing research through photographic arts practice and the science of the botanist Dr Natasha De Vere. This paper

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explores the partnership of photographic artist and scientist in this second collaboration (the first being Barcode Wales), where the science investigating the role of insects, such as moths, as pollinators is explored through arts practice. For this exhibition three other artists are interpreting the science of Barcode UK through different mediums and voices. References and comparisons will be made to the interactions and added value of Science and Art collaborations through a range of other science/art projects.

Both the scientist De Vere and I are working on very different research questions, the aim of the combined project is to identify possible integration and overlap in the collaborative process, and any resultant changes of perspectives, leading to new avenues of investigation.

Originally the work was conceived as an arts project to communicate the science, particularly to the non-science community. James Howie of The Art Collective firmly believes:

Bringing data to life visually will be increasingly important in a world in which images, from traditional media to YouTube, are a primary means of communication. New ways of conveying scientific data will be essential not only for increasing public understanding of science and engineering, but also for improving communication across scientific disciplines. (Shuler, 2009:26)

The integration of art and science is far more complex than artists helping scientists communicate, and this will be another issue consideration within the paper. Gerfried Stocker, the Artistic Director of Ars Electronica, when discussing the CERN science/art project 2012 suggests:

It is not the case that artists can help scientists to communicate their topics in a better way to the audiences, artists don’t have the task to create a more beautiful website to publish the scientific findings, as well as the scientists should not have the task to help the artists understand technology or science in a better way. (Stocker, 2012)

During the developing relationship of the scientist and artists working towards the Barcode

UK- Moving beyond the Visible project, many of these complexities were revealed. Some

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overlap in the research of De Vere and myself was apparent from the early stages of the collaboration but insights arose, particularly in the recent work, that were not considered by either the artist or scientist at the beginning of the project.

This paper will review some of these findings and will also refer to other Sciart projects such as the concurrent project at the CERN, ‘Creative Collisions’ Prix Ars Electronica Collide@CERN, where artist Julius Von Bismarck worked with theoretical physicist Dr James Wells.

As preparation for the collaboration, the research themes of both the scientist and artist were brought together to explore connections and possible areas of mutual interest. My research and photographic practice, explored the cultural complexities of the values applied to landscape photography and the absorption of keywords of wilderness, sublime and picturesque into the language of photography. The research, primarily through practice, was focused upon the application of alternative photographic aesthetics, technologies and processes of making, to the representation of the diversity of landscape. A particular focus was and continues to be on how issues of both technology and composition in photographic transformations affect the creation of meaning, which in turn influence the values ascribed to a range of landscapes.

According to Williams and Lavalle , “The general population agrees on landscape tastes (re. ranking landscape types) and on the qualitative values they attribute to the landscape”. (Williams and Lavalle, 1990 : 1019) To date landscape has usually been represented through a photographic aesthetic based upon the ideals of the eighteenth century picturesque painting, which has had profound consequences in terms of the value of a landscape and its subsequent preservation or destruction. The problem this creates is how do those environmental agencies concerned with the preservation of landscapes, which score low on the taste scale, represent such landscapes through photography? Are there photographic compositional strategies other than the traditional (Cartesian perspectivalism) that would provide multifaceted representations of the landscape to celebrate the confusion and the unpredictability of difference? The research, I had undertaken before the start of the two collaborations produced three main outcomes: the first stage demonstrated that there was an established compositional framework for viewing and photographing the landscape and that this formed the basis of a large proportion of landscape photography, particularly amateur and tourist outputs. The notion of the picturesque landscape composition, which identified ‘what would look well in a picture’ was founded and popularised predominantly by the Reverend William Gilpin (1794), being partly based upon notions of beauty formulated by Kant (1724 -1804) and Burke (1729 -1797), and was influenced by the paintings of such artists as Claude Lorrain. (Liggins, 2005) The research demonstrated that landscape compositions that conformed to Gilpin’s notion of correct compositions were also the ideal ‘picturable’ compositions at the end of the 20th century. Evidence was also found to support the notion that the value of a landscape was chiefly based upon its ability to be formed into a work of art.

The second part of the research considered the impact of this compositional formula upon the environment and evidenced that this traditional practice of landscape photography has environmental consequences for two reasons. Firstly, by photography’s influence over whether a place is viewed favourably, unfavourably or ignored. In the UK landscapes such as Snowdonia, that conform to these aesthetic requirements receive the greatest protection (often through the National Park Authority) and conversely those landscapes that do not comply to the picturesque formula sometimes have no protection, for example, the survey for the selection of sites for wind-farms are primarily based upon the aesthetic value of the surrounding landscape, with those scoring lowest in the value scale being targeted as ideal locations. (Liggins, 2007)

Secondly, the view from the hill as an important part of the traditional strategy for composition associated with control and ownership, has also brought with it environmental consequences. The reduction of the landscape to pattern and shape and to the position of distant

‘Other’ creates a separation, both physically and emotionally, of the spectator and the spectacle.

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This position has important consequences in that photography creates landscapes reminiscent of

Arcadia, even from chaos and destruction. (Liggins, 2005)

As a result of this research the case was made for alternative compositional strategies to represent the landscape, which would better communicate political, non- conformist and environmental issues. Related research concerning aesthetics and scopic regimes by such writers as Martin Jay (1988), Sveltlana Alpers (1983) and Suren Lalvani (1996) was applied to landscape photography, both through theoretical and practical research. The prevalent scopic regime as applied to landscape photography, that of Cartesian perspectivalism with its characteristics of order, precision and distance has particular environmental and political implications for the reasons outlined above. The Baroque aesthetic, however, applied to landscape photography, celebrated the chaos and unpredictability of landscape, and centres the viewpoint to the midst of the subject. This aesthetic, which Jay (1988) describes as painterly, recessional, soft-focused, multiple, open, melancholic, opaque, contradictory, tactile, and ambiguous, is fundamental in the portrayal of the chaos, the compound nature, the mutability and the elusiveness of the landscapes and plants.

**The Background to the Science of Barcode UK**

Initiatives around the world are now DNA barcoding all living things from animals to plants, microbes to fungi and these form part of the worldwide Barcode of Life Database (BOLD) for the open access use of scientists globally. Scientists led by Dr De Vere, at the National Botanic Garden of Wales, working with partners at the National Museum Wales have completed the DNA extraction of the entire flora of Wales, 1143 native flowering plants and conifers over the last three years. An extension of this project is underway with Kew Gardens and the Royal Botanic Garden Edinburgh to DNA the flora of the whole of the UK (Barcode UK).

The applications are increasingly expanding with scientists around the world. Some examples to date include:

• tracking the movements of pollinators in threatened habitats by DNA barcoding pollen found on their bodies;

• the use of DNA barcoding to carry out ecological surveys and to reconstruct landscapes from plant remains in the soil;

• working with Cardiff University, the NBGW is collecting honey samples from throughout the UK and testing their ability to fight the hospital infections MRSA and *Clostridium difficile.* Following the collection of samples it is possible to DNA barcode the honey to find out what plant species the bees visited to make it. In the longer term it is planned to use this to pinpoint active phytochemicals donated by the plant species that contribute to the honey’s anti-microbial properties.

**The Meeting Point of the Two Projects**

During the first art/science project with the scientist De Vere, I became interested in the applications of the science, particularly the work undertaken to identify the role of pollinators. My previous research has involved the photography of plants, cultivated and wild flowers, grasses, ‘waste-grounds’ and hedgerows for their abundance and disorder, so the photographic representation of insects was a departure from the usual subject matter, brought about entirely because of the art and science interaction. For this new work I am still photographing flowering plants but it is their luminosity at dusk that has become the focus of the work. These images are paired with those of the moths, photographed using mobile-phone technology, as in the examples below.

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My early landscape photography was described as “creating a sensation of place rather than its description” (Greetham, 2000:14) The plants of my previous photographs grow in confusion, and in situ cannot be isolated and defined. The organization Common Ground UK describes the landscapes where these wild flowers grow in the same way.

Attempts should not be made to reduce local distinctiveness to an essence. It is a compound thing and a messy one, as well as being dynamic, hence its elusiveness. It cannot be summarized. It may be variegated from within, but have unity and integrity in the mingling of its parts. (Common Ground, 1993)

The photography for the Barcode UK- Moving beyond the Visible project extends this dynamic and often messy environment of flora by using the same methodology to photograph the moths and other pollinators within it. The photographs are made at dusk using artificial light sources and share many of the ideals of the earlier landscape work, prioritizing the glance over the gaze. Both the science and the photography are actively and intimately involved with the wildflowers, the pollinators and the landscapes in which they are found. Neither scientist nor artist is a distant observer.



Fig 1&2 Examples of recent photography by author for Barcode UK—Moving beyond the Visible project

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**The Collaboration**

As suggested in the introduction, however important the visual translation of scientific findings, this is not the role of the artist working with science projects. This type of work is perhaps more the realm of informational graphic design. Some scientists may see the role of the artist as merely visualising the scientist’s perspective, this too fails to recognise its full potential. Art can, however, enable or increase public accessibility to complex scientific research and data, particularly with science, such as genetic engineering, that challenges widely held ethical belief systems. Keith Davies asks whether art can be used to help integrate our emotional response to public concerns about biotechnology? He notes several scientific establishments, including Rothamsted Research that have employed an artist-in residence to try to heal this dislocation between science and the public. (Davies, 2003:131)

Although focusing upon flora rather than fauna, the Barcode UK DNA science resonates with genetic engineering, at a basic level of ordering and cataloguing of life and in the extreme of

‘cloning’. Once involved with the project the benefits of such work and the work of all the

science in the open access resource Barcode for Life Database (BOLD) was easily understood, but other artists, from the University where I am employed, were curious about working with what was seen as genetic science.

One of the roles of the artist in a scientific project is to personally interpret for dissemination within the public domain, the often invisible and abstract aspects of the project. Working with anatomy departments, Karen Ingham suggests “traditionally, it has been the role of the artist to render the unrepresentable, to negotiate spaces of denial.” (Ingham, 2004: 7)

For this collaboration, to disrupt the idea of order and cataloguing I am more interested in photographing the space between, the indefinable places. The use of the Baroque aesthetic coupled with a more intimate view of the subject, whether plant or insect, countered analysis and identification with disorder and confusion. The chief scientist on the project De Vere wrote in the exhibition catalogue of the earlier collaboration:

The plant species in Andrea's photographs have a personality of their own, like actors in a play. Sometimes we can tell what they are, sometimes they are more elusive. Sometimes they become something else - the image of the plant turning into light and shadows or natural shapes against the backdrop of the vegetation. (De Vere, 2012: 14 )

These ideas have continued with the more recent body of work, for both the photography of moths and the plants at dusk. The use of artificial light, such as flash, for this latter work, creates shafts of light that interrupt obscure dark spaces, where very little can be identified.

For Stocker of the collide@cern project, the artist and scientist can work together to explore and perhaps interrogate the negative perception of both science and art, particularly in fields where the social impact is not evident, he suggests artists and scientists, “joining together to go out in to the public and to face together some of the critics who are always asking what is this for, why are we spending so much money on science and why are we spending so much on art.” (Stocker, 2012)

It is difficult to measure the impact of the first collaboration Barcode Wales – Beyond the Visible exhibition in China, but the dissemination was wide, with over one million visitors to the Nanshan Botanical Gardens, where it was held for three months. A range of lectures and interventions enabled both the scientist and artist to discuss the work with students, artists, community groups and scientists, with enthusiastic engagement and feedback. The exhibition and visit was supported by the Welsh Government and as such raised the profile of the project in its homeland as well as overseas.

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Whether art can help heal the division that now exists between science and society will remain to be seen, but even if it cannot heal the division, it is an excellent method to open up a much needed debate. (Davies, 2003:133)

With this latest collaboration, as four artists are involved, there is a range of ideas and intentions. A ceramicist, Joanna Howells, is interested in traces of rare species of British flora and visualizing her ideas through the use of fine porcelain; a printmaker, Emma Tuck, is working at a micro-biological level drawing plant sections; and the third artist, Robin Dring, is using the waste plant material from the DNA process to produce imagery created through the light action upon chlorophyll. One of the aims of my photography research is to disseminate work that is promoting sustainability projects, such as the present pollinator crisis. In this way the forthcoming Barcode UK-Moving beyond the Visible exhibition, will forge links between a comprehensive range of sectors of society and the science. Without such exhibitions not only would the science not have such a wide exposure but fewer groups and individuals would engage with the project to the same extent.

Far from just visually representing an idea, the artist in some projects can influence the concepts and decision making of the scientist and visa versa, as was found in a study of science and art projects by Wright and Linney.

Whilst many contemporary scientists are interested in the decorative or evocative qualities of art, and in using art to illustrate their work or to render it publicly accessible, there are also those who feel constrained by their allotted discipline and feel that an artist could bring a new understanding to the ideas and processes they are working with. (Wright and Linney, 2006:4)

In a collaborative project of Catherine Yass artist and scientist Mary Morrell, who was studying sleep patterns, the resultant artwork went far beyond the representational. “I was interested in the limitations of my instruments and the impossibility of representing something," says Yass. "I enjoy that in photography – how it can point to a failure?” ( Jeffries, 2011)

The scientist is usually expected to produce evidence and results for a funded project but in the project with Yass, the scientist Morrell was very surprised that funding supported an art project that contained elements of failure and that the artist was keen to explore failure. "Essentially, once we got funding for the project from the Wellcome Trust, we were allowed to find nothing, which to me was incredible." Jeffries reporting on the project suggests that “maybe that freedom…can give artist and scientist alike the chance to think outside the box.” (Jeffries,

2011)

The association of taking risks in the art world is an accepted one, and is part of higher

education within the creative arts, where process is valued as well as product. Experimentation and experiential learning are the foundations of many European art education programmes.

At the present time, therefor, the influence of art upon science is often perceived as adding that element of speculative risk-taking.

The flexible and non-prescriptive conditions associated with the administration of Sciart were valued as having directly contributed to greater levels of risk-taking and thus to innovation, and a perceived ‘permission to fail’ was seen as a strength of the Sciart scheme. It was suggested that artists were more likely to be innovative and to take risks than scientists, but that some scientists had become more open to risk-taking through their association with artists. (Glinkowski, Bamford, 2009:8)

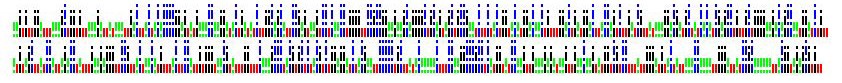
As the artist I was surprised to discover that the collaboration created the opportunity for greater risk-taking in the artwork, as the photography was released from certain conceptual and aesthetic demands, largely self imposed, produced by perceived expectations derived from

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previous work. By using a digital camera for most of the photography the methodology is significantly different than for previous projects, as the number of images that could be made are limited only by time. This has encouraged a considerable amount of exploration and also playfulness, as the imagery becomes disposable. Viewing the image through the viewfinder is irrelevant, most images are made from within the floral cluster, the camera held inside of a bush, or in very low light levels where detail is not visible through the lens. The resultant images fulfill the aims of the research, by relocating the viewer from a fixed position outside of the subject to a position within a mutable space and time. The work has become very intuitive and in many ways random, completely in opposition to the methodical process of extracting DNA. The four artists working towards the same exhibition are equally experimental and are exploring the project using different mediums of printmaking, ceramics and photography. Although with the Barcode UK project the playful photographic methodology has not encouraged the scientist to abandon the serious deliberate processes necessary for the science, some of the work has encouraged other perspectives when reviewing the project. De Vere suggests:

Working with artists makes me look at my work differently. It makes me consider more about why we were all engaged in these activities. I believe for all of us it is about trying to understand the plant species we share the UK with and by doing so our place amongst them. (De Vere, 2013)

One of the visually creative interactions from the science perspective is the design of the visual barcodes. From my perspective the ‘barcodes’ were expected to look like the barcodes seen on products, however, until the first collaboration they were actually a series of letters, with no visual representations. The computer scientist for the project designed the barcode visuals to put in the exhibitions using the colours officially assigned to each letter and immediately above each ‘bar’ the Morse-code representation of each letter. Thus the creative expression of the project does not reside purely with the artist.



Agrostis Stolonifera DNA visual representation

For the previous exhibition, it was the agreement between both the scientist and artist that these barcode symbols would be the only identification of the plants, in spite of the public’s repeated requests to attach the plant names. The scientist’s preference for the relative anonymity of the plants was surprising but the idea appealed that one could find the species through solving the puzzle of the barcode symbol. As a result the symbolic labeling emphasized the common aim of both the science and art, that each plant had the same value, the common ‘weed’ being equally important to the rare wild flower. The science has yet to discover which plants may be important to for example the survival of pollinators, which plants do bees visit to make antibiotic honey, and other possible future uses of the research. In the new work for Barcode UK - Moving beyond the Visible the species of moth are also not recognizable in the imagery it is the relationship of these insects to the environment and to the space around them that is important.

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Papaver rhoeas with barcode, as exhibited.

To myself as photographic artist this anonymous rendering of value supports my ongoing quest to find a photographic aesthetic that could raise the currency of the landscape of the familiar, the peat bog and the hedgerow to the majestic view from the summit of a mountain.

Each scientist and artist may start with different aims and perspectives but the experience of the Barcode UK - Moving beyond the Visible project and others considered in this paper, can often conflate these differences. The resultant change in perspectives of artist and scientist can lead to new avenues of creative exploration for all the collaborating researchers.

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**ABOUT THE AUTHOR**

***Professor Andrea Liggins:*** Andrea Liggins is the dean of the Faculty of Art and Design at the University of Wales Trinity Saint David. She holds a PhD in photography and landscape (2005), and achieved a chair in photographic studies in 2007. She is a photographic artist and exhibitions of her photography have been shown in, China, India, Russia, across Europe, and the UK. Recent works include Uncertain Terrain—The Garden (2013) and Unreliable Truths (2008), which both continue a long-term photographic project that explores alternative ways of engaging with landscape/space to engender a greater sense of involvement. Liggins’s current research is in conjunction with the National Botanical Garden of Wales as part of the Barcode UK project. In her role as dean of the Faculty of Art and Design, Liggins has led successful funding applications for European projects, totalling more than £7 million, and has directed the resultant projects, including the Creative Industries Research and Innovation Centre (CIRIC). Through these funded project centres, she has created and facilitated strong links between science, technology, environment, and the arts.

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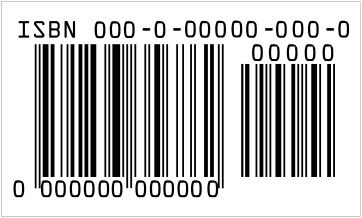
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As well as papers of a traditional scholarly type, this journal invites presentations of practice—including experimental forms of documentation and exegeses that can with equal validity be interrogated through a process of academic peer review. This, for instance,

might take the form of a series of images representing artistic practice, together with explanatory notes that articulate this practice with other, significantly similar or different and explicitly referenced practices.

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